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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,388	09/30/2003	Chih-Tsung Shih	1651-0163P	3746

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EXAMINER	
LAVARIAS, ARNEL C	

ART UNIT	PAPER NUMBER
2872	

DATE MAILED: 03/15/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/673,388	SHIH ET AL.
	Examiner	Art Unit
	Arnel C. Lavarias	2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 September 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/30/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The preliminary amendments to the specification of the disclosure filed 9/30/03 are acknowledged and accepted.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

3. The drawings were received on 9/30/03. These drawings are objected to for the following reason(s) as set forth below.

4. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the tilt angle of the mirror interposed between the first and second collimators (See Claim 1, lines 5-7) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be

canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description:
Figures 2-3- Reference numeral 32.
Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:

Page 1, line 23- Reference numerals 73, 74.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

7. Figure 5 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

8. The drawings are objected to because of the following informalities:

Label caption 'FIG. 8' should read 'FIG. 9'

Label caption 'FIG. 9' should read 'FIG. 8'.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

9. The disclosure is objected to because of the following informalities:

Page 1, line 5- 'MEMS' has not been previously defined. The full, unabbreviated word or phrase must be included the first time an abbreviation is used.

Appropriate correction is required.

Claim Objections

10. Claims 3-8 are objected to because of the following informalities:

Claim 3 recites the limitation "the concave lens surface of the mirror" in lines 5-6. There is insufficient antecedent basis for this limitation in the claim. Claims 4-5 are dependent on Claim 3, and hence inherit the deficiencies of Claim 3.

Claim 6 recites the limitation "the lens surface" in line 2. There is insufficient antecedent basis for this limitation in the claim. It is noted that the first collimator has not been previous defined as having a lens surface. This limitation has been taken to mean 'the surface of the first collimator' for purposes of examination. Claim 8 is dependent on Claim 6, and hence inherits the deficiencies of Claim 6.

Both Claims 7 and 8 recite the limitation "the lens surface" in line 2 of each claim. There is insufficient antecedent basis for this limitation in the claim. It is noted that the second collimator has not been previous defined as having a lens surface. This limitation has been taken to mean 'the surface of the second collimator' for purposes of examination.

Both Claims 7 and 8 recite the limitation "the concave lens" in line 3 of each claim. There is insufficient antecedent basis for this limitation in the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1, 7, as best understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Tehrani (U.S. Patent No. 5430574).

Tehrani discloses a tunable filter with a wide free spectral range (See for example Figures 3-7), comprising a first collimator (See 14 in Figure 3); a second collimator opposed to the first collimator (See 15 in Figure 3); and a mirror (See 21 in Figure 3) interposed between the first and second collimators, with an appropriate tilt angle (It is noted that the surface of the mirror at the point of light incidence is tilted orthogonally to the propagation axis of the incident light) and a high reflectivity lens, such as a concave lens (It is noted that the mirror 21 provides a surface with a concave curvature which will also inherently provide a lensing/focusing function to the incident light reflected back from element 21 in Figure 3), whereby a resonance cavity is defined in a space between the mirror and the second collimator (See space between 21 and 22 in Figure 3). Tehrani additionally discloses the mirror interposed between the first and second collimators comprising alternating layers of TiO_2 and SiO_2 (See col. 2, lines 36-47); the second collimator having a high reflectivity layer on the surface of the second collimator (See 22, 15 in Figure 3; it is noted that mirror 22 is in contact with a surface of the second collimator 15), whereby a resonance cavity is defined in the space between the concave lens of the mirror and the second collimator; and the mirror being coated with a multilayer film (See col. 2, lines 36-47) on a concave lens surface on opposite side of an aperture (See 13' in Figure 3) on a substrate (See 11a in Figure 3).

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

14. Claims 6, 8, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Tehrani in view of Huang (U.S. Patent No. 6263128).

Tehrani discloses the invention as set forth above in Claim 1, except for the first collimator having an antireflective coating on the surface of the first collimator. However, the use of antireflective coatings of surfaces of optical elements, such as collimators and lenses, are well known and standard practice in the art. For example, Huang teaches a particular embodiment of a Fabry-Perot etalon filter (see for example Figures 6-7), wherein the surfaces of one or both of the collimators (See 71, 72 in Figure 7) may be coated with an antireflective film (See 77 in Figure 7). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first collimator have an antireflective coating on the surface of the first collimator, as taught by Huang, in the filter of Tehrani, for the purposes of reducing optical noise due to unwanted back reflections in the incident signal.

15. Claim 2, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Tehrani in view of Domash (U.S. Patent Application Publication US 2003/0072009 A1) and Vail et al. (E. C. Vail, M. S. Wu, G. S. Li, L. Eng, C. J. Chang-Hasnain, 'GaAs

micromachined widely tunable Fabry-Perot filters', Electr. Lett., vol. 31, no. 3, Feb. 2, 1995, pp. 228-229.).

Tehrani discloses the invention as set forth above in Claim 1, except for the tunable filter using a heat actuator and the multilayer membrane being formed with alternate layers of GaAs and AlAs. However, the use of heat-, piezoelectric-, and electrostatic-based actuators to adjust the Fabry-Perot reflector spacing to provide center wavelength tunability is well known and conventional in the art. For example, Domash et al. teaches a tunable thin film Fabry-Perot filter (See for example 101 in Figure 1), wherein central wavelength tunability is provided for by the use of a heat conducting film resistor deposited onto the Fabry-Perot filter, the film resistor being connected to a temperature controller (See 102 in Figure 1; Figures 3-9; Paragraphs 0059-0068). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the tunable filter of Tehrani use a heat actuator, as taught by Domash et al. for the purpose of providing rapid, repeatable, and wide shifts in the transmission wavelengths of the filter without use of moving parts. The combined teachings of Tehrani and Domash et al. lack the multilayer membrane being formed with alternate layers of GaAs and AlAs. However, the use of GaAs and AlAs for forming the multilayer films in Fabry-Perot filters is also well known and conventional in the art. For example, Vail et al. teaches a conventional Fabry-Perot filter (See Figure 1), wherein the various multilayer films are composed of multiple pairs of alternating layers of GaAs and AlAs (See col. 2, Paragraph 1) to provide high reflectivities for the light traversing the cavity of the filter. Therefore, it would have been obvious to one having ordinary skill in

the art to have the multilayer membrane of the tunable filter of Tehrani and Domash et al. be formed with alternate layers of GaAs and AlAs, as taught by Vail et al., for the purpose of providing wide, continuous, polarization insensitive tuning of the filter, which takes advantage of simple, high-yield, mature semiconductor processing technologies of III-V semiconductors.

16. Claims 3, 5, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Tehrani in view of Atia (U.S. Patent No. 6721098).

Tehrani discloses the invention as set forth above in Claim 1, except for the tunable filter using an electrostatic actuator and the mirror having a dielectric layer and an electrode layer formed on top of the mirror forming air pockets on the opposite side of the aperture on the substrate and the surface of the mirror. However, it is noted that the use of heat-, piezoelectric-, and electrostatic-based actuators to adjust the Fabry-Perot reflector spacing to provide center wavelength tunability is well known and conventional in the art. Atia teaches an alternative form of a Fabry-Perot filter based on micro-optical electromechanical technology (See for example Figures 2-3). In particular, Atia teaches that the deflection of the films or layers forming one or both of the reflectors may be performed by electrostatics, i.e. application of a voltage to thin film electrodes formed on or adjacent to the various reflectors of the filter (See for example Figure 1). Atia further teaches that a curved mirror (See for example 134 in Figure 2) may be attached to a dielectric layer (See for example 120 in Figure 2) and an electrode layer (See for example 116 in Figure 2; col. 4, line 58-col. 5, line 12) formed on top of the curved mirror, thus forming air pockets (See for example spaces near region 138 in Figure 2) on the opposite

side of the aperture on the substrate (See 124 in Figure 2) and the surface of the mirror. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have the tunable filter of Tehrani use an electrostatic actuator and to have the mirror have a dielectric layer and an electrode layer formed on top of the mirror forming air pockets on the opposite side of the aperture on the substrate and the surface of the mirror, as taught by Atia, for the purpose of 1) providing stable, rapid, repeatable, and wide shifts in the transmission wavelengths of the filter with very low voltage/power requirements, and 2) separately optimizing the parameters of the electrostatic cavity without impacting the optimization of the Fabry-Perot filter cavity.

17. Claim 4, as best understood, is rejected under 35 U.S.C. 103(a) as being unpatentable over Tehrani in view of Atia as applied to Claims 1, 3 above, and further in view of Vail et al.

Tehrani in view of Atia discloses the invention as set forth above in Claims 1, 3, except for the multilayer membrane being formed with alternate layers of GaAs and AlAs. However, the use of GaAs and AlAs for forming the multilayer films in Fabry-Perot filters is also well known and conventional in the art. For example, Vail et al. teaches a conventional Fabry-Perot filter (See Figure 1), wherein the various multilayer films are composed of multiple pairs of alternating layers of GaAs and AlAs (See col. 2, Paragraph 1) to provide high reflectivities for the light traversing the cavity of the filter. Therefore, it would have been obvious to one having ordinary skill in the art to have the multilayer membrane of the tunable filter of Tehrani and Domash et al. be formed with alternate layers of GaAs and AlAs, as taught by Vail et al., for the purpose of providing

wide, continuous, polarization insensitive tuning of the filter, which takes advantage of simple, high-yield, mature semiconductor processing technologies of III-V semiconductors.

Conclusion

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arnel C. Lavarias whose telephone number is 571-272-2315. The examiner can normally be reached on M-F 9:30 AM - 6 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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3/7/05